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ABSTRACT

Eleven major models of learning styles are compared in terms of variables, appropriate populations, validity of instrumentation, and supporting research. Discussion considers: (1) Dunn and Dunn's Learning Style Inventory for grades 3 through 12 and Productivity Environmental Preference Survey for adults; (2) National Association of Secondary School Principals' (NASSP) Learning Style Profile; (3) Hill's Cognitive Style Profile; (4) Letteri's Cognitive Style Delineators; (5) Ramirez's Child Rating Form; (6) Reinert's Edmonds Learning Style Identification Exercise; (7) Schmeck's Inventory of Learning Processes; (8) Hunt's Paragraph Completion Method; (9) Kolb's Learning Style Inventory; (10) Gregorc's Style Delineator; and (11) McCarthy's 4 MAT System. Concluding discussion points out two consistent concerns: whether teachers should teach to students' strengths or attempt to expand students' style, and whether teachers can observe the differences between students' styles or should use valid and reliable instrumentation to determine these differences. Guidelines for using a model of learning styles in the schools are provided. Nearly 125 references are cited. (RH)

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COMPARISON OF ELEVEN MAJOR LEARNING STYLES MODELS: Variables; Appropriate Populations; Validity of Instrumentation; and the Research Behind Them

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Validity of Instrumentation,
and the Research Behind Them

THEORIST	ELEMENTS OF MODEL						
DUNN & DUNN	ENVIRON-MENTAL	EMOTIONAL	SOCIOLOGICAL	PHYSICAL	PSYCHOLOGICAL		
N.A.S.S.P.	ENVIRON-MENTAL	EMOTIONAL	SOCIOLOGICAL	PHYSICAL	PSYCHOLOGICAL/ COGNITIVE		STUDY SKILLS
HILL				QUALITATIVE/ THEORETICAL SYMBOLS	MODALITIES OF INFERENCE	CULTURAL	
LETTERI					COGNITIVE STYLE		
RAMIREZ					BI-COGNITIVE STYLE	BI-CULTURAL	
REINERT				PERCEPTUAL MODALITIES			
SCHMECK					COGNITIVE PROCESSING		STUDY METHODS RETENTION
HUNT		NEED FOR STRUCTURE	NEED FOR AUTHORITY DEPENDENT/INDEPENDENT				
KOLB					CONCRETE EXPERIENCE VS. ABSTRACT CONCEPTUALIZATION ACTIVE EXPERIMENTATION VS. REFLECTIVE OBSERVATION		
GREGORC					PERCEPTION/ ORDERING		
McCARTHY					INNOVATIVE/ANALYTIC/ COMMON SENSE/DYNAMIC HEMISPHERICITY		

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Learning Style Researchers

Perhaps the most vital development in American education today is the concept of individual learners' preferences. Teachers, school boards, and parents across the nation have become cognizant of various aspects of learning styles and it is encumbent upon those who would be educational leaders to become knowledgeable about current research in learning styles.

This paper will examine the efforts of recognized leaders in the field, theorists who have developed and established reputations over the years. Learning style models will be reviewed based, in part, on the: psychometric analyses of Dr. Lynn Curry (1987) for the Candian College of Health Services in Ontario, Canada; the publication of Dr. Patricia Kirby at the National Center for Research in Vocational Education, Ohio State University, Columbus Ohio; publications disseminated by the Center for the Study of Learning and Teaching Styles at St John's University; and my own experiences and analyses.

There are nearly as many definitions of learning style as there are theorists. Through the leadership of Dr. James Keefe, Director of Research, the National Association of Secondary School Principals' (NASSP) Learning Styles Task Force, the following definition emerged:

Learning styles is the characteristic cognitive, affective, and psychological behaviors that serve as relatively stable indicators of how learners perceive, interact with , and respond to the learning environment(1986).

Perhaps an even more generic definition would be: Learning style is the way people absorb and retain information. Recognize then, that not all theorists view learning styles in precisely the same terms and, therefore, their methods for assessment and observations may differ.

Some models are multideminsional, encompassing cognitive, affective, and physiological characteristics, and others are limited to a single variable --- most frequently from the cognitive or psychological domain.

I have selected certain models because they: represent a historical perspective; have influenced others'; reflect individual practitioners' attempts to identify style; relate to concurrent issues in education; are research oriented; or, are widely known in the field.

DUNN AND DUNN

INSTRUMENT: Learning Style Inventory (Gr.3-12); Productivity Environmental Preference Suvey (Adult)

Perhaps one of the earliest teams of research practioners in the field of learning styles are professors Kenneth and Rita Dunn. Their model of learning styles can be classified as multidimensional. The five stimuli groups encompass areas of environmental, emotional, sociological, physiological, and psychological areas, and contain 21 sub categories which the Dunns refer to as elements. These elements do not impact equally on all learners. Those that affect individuals strongly are referred to by the Dunns as Strong Preferences; others that are important, but influence less, are called preferences.

The environmental stimulus contain the elements of sound, light, temperature, and design. Emotionality includes motivation, persistence, responsibility and structure. The sociological stimulus contains the elements of learning alone, in a pair, with peers or as a part of a team, with an authoritative or collegial teacher, or in varied treatments-- in other words, a combination of social patterns. Physical elements include perceptual modalities, the need for intake, time-of-day energy periods,and the need for mobility versus passivity.

The psychological dimensions include global/analytic, hemisphericity, and impulsive/reflective characteristics. Although this stimulus is not assessed separately through the Learning Style Inventory (Dunn, Dunn, and Price), research confirmed correlations between being strongly global and needing low light, sound when learning, an informal design, and intake, and between being strongly analytic and needing bright light, quiet while learning, a formal design, and no intake (Bruno, 1988; Dunn, Cavanaugh, Eberle, and Zenhausen, 1982).

The Dunns' model is the basis of a diagnostic/prescriptive approach that is initiated through the identification of learners' styles through a self report instrument and the application of complementary teaching techniques designed to reapond to the youngster's style. Of key importance to the theoretical structure of the model, is the tenet that individual styles must be assessed and that, if a learner is going to have the best opportunity to learn, instructional techniques must be employed that are congruent with each student's style. You will

see, as we progress, that not every theorist agrees with that stance.

Critical to the Dunns' approach is the instrument which assesses style -- the Learning Style Inventory (LSI) -- which is comprised of 100 items and requires approximately 30 minutes to administer. That instrument, in different forms, is intended for youngsters in grades three through high school. The LSI Primary Version, developed by Dr. Janet Perrin, is an adaptation essentially for non-readers. The Productivity Environmental Preference Survey (PEPS)(Dunn, Dunn, and Price) is a version intended for adults and may have applications outside of the school setting.

The Reading Style Inventory(RSI), developed by Dr. Marie Carbo relies on the theoretical framework of the Dunn model in much the same way as Gregorc, McCarthy, and Kolb have certain conceptual similarities heavily steeped in Jungian theory. Carbo's RSI is an independent, but correlated instrument, with the Dunns' LSI.

Extensive research employing the LSI has made it the most widely documented assessment instrument (Dunn, Beaudry, and Klavas, 1989). Dr. Curry's 1987 review of 21 different learning/cognitive style models through psychometric analyses reported that the Dunn and Dunn model had among the highest reliability and validity ratings.

Ohio State University's National Center for Research in Vocational Education published the results of a two year study of instruments. It reported that the LSI had "impressive

reliability, and face and construct validity" (Kirby, 1979, p.72).

Since 1979, the LSI has evidenced extremely high predictive validity. The award-winning, experimental and correlational research with the LSI conducted at more than 45 universities, distingulshes this model's research base. Keefe (1982), identified the Dunns' model as being practioner oriented and the most widely used assessment in elementary and secondary schools.

NASSP

INSTRUMENT: Learning Style Profile

In 1979, NASSP and St. John's University undertook the cosponsorship of the National Learning Styles Network, a component of the University's Center for the Study of Learning and Teaching Styles. Four years later, the National Learning Styles Task Force, under the leadership of Dr. Keefe, assembled to examine the underlying attributes of each of the better known learning style constructs. From that group emerged the definition I illustrated earlier, and a commitment to create a single learning style instrument that assessed a broad spectrum of research-based learning style characteristics. Letteri's (1980) perspective (1982), relating learning styles to information processing, was adopted as the basis for conceptualization of NASSP's learning style model (Keefe and Monke, 1986).

That model emcompassed physiological/environmental, cognitive, and affective domains, as well as an information-

processing perspective. The net result is a 42 page, 126 item assessment intended for use with secondary students. As in the case of the Dunn and Dunn model, responses are computer scored and tabulated, and respondents receive a computer-generated printout of their individual learning style profile.

You will note that, in terms of the elements of the NASSP model, there is a great deal of similiarity with the Dunn model. Study skills are addressed through the prescriptive process of the Dunn model, which emphasizes that students learn through their strongest modality or preference, and are reinforced through their secondary or tertiary strength, and then are taught to, finally, apply the new information creatively. (The LSP diverges from that philosophy.)

Continuing this amalgamated approach, cognitive skill items were derived from Witkin's Group Embedded Figures Test (GEFT), perceptual responses from Reinert's (1976) ELSIE, and environmental, affective, and physiological items from the Dunn and Dunn Model. Keefe has reported that, while significant correlations were established among the LSP, the LSI, and ELSIE, no significant correlation emerged between the LSP and the Group Embedded Figures Test. Furthermore, Curry reported similiar findings.

The NASSP's Learning Style Profile is an advancement, because it represents the first model to be created out of the diverse and occasionally opposite-philosophies of current theorists. Because of its relatively recent arrival, I suspect that further refinements of the instrument will be forthcoming.

HILL

INSTRUMENT: Cognitive Style Profile

One of the earliest theorists in the field of learning style was Joseph Hill (1976). Hill was president of Oakland Community College in Michigan during the late 1960s and early 1970s. He defined learning style as the unique way in which an individual searches for meaning.

To Hill, that process was reflected in:

1. the processing of theoretical and qualitative symbols;
2. modalities of inference;
3. cultural determinants.

Lets look briefly at each of those componen' .

The category of theoretical symbols is subdivided into auditory and visual categories, each further subdivided into linguistic and quantitative symbols, in effect, the perceptual modalities.

There are, in addition, 15 qualitative elements. Among the 15 are empathy, proxemics -- which is social distance, and proprioceptivity -- a sixth sense.

Modalities of Inference are the second major category; they are the forms of inference an individual employs in the process of actually obtaining meaning. Specific elements in this category include: critical thinking; contrasting and comparisons; relationships between measures; and hypothesis development--

some of which are reminiscent of Bloom's taxonomy. Hill's background was in engineering and, while he was in command of the concepts of cognitive psychology, he tended to develop his own specific jargon.

The third major element of Hill's model is refered to as Cultural Determinants. Much of how Hill saw cognitive style was in terms of how individuals interpret symbols, and he believed that the meaning that is assigned to symbols is shaped by one's culture, and that family and peers form each student's main cultural influences.

This element is interesting in that it is only one aspect of Hill's Cognitive Style Profile. However, it is most likely viewed today as a precurser to work which seeks to identify cultural patterns to learning styles. I have placed it into the category with Ramirez' model for that reason. However, there is another view, which sees the emphasis on family and peers as, perhaps, more akin to the Dunn's sociological stimulus, in that both peer orientation and authority orientation may be viewed as aspects of the individual's immediate culture.

In either case, Hill has provided the student of learning styles with much to consider. Cognitive Style Mapping is the rather elaborate process of obtaining a cognitive style profile. It involves a self-report test which takes about 50 minutes to administer, as well as an interview component.

The Cognitive Style Interest Inventory has been revised during the years since Hill's death; however it remains rather complex. Although Curry (1987) reported that this instrument had no reliability or validity evidenced, I believe that Hill's

early attempt at a comprehensive diagnostic prescriptive approach to learning style is worthy of study for the principles of learning it presented.

LETTERI

INSTRUMENTATION BASE: Cognitive Style Delineators

CHARLES LETTERI's (1980) model views learning as information processing-- the storage and retrieval of information. In Letteri's view, there are six phases of information processing that range from perception reception to long-term memory. To Letteri, failure to process information at any of the phases, represents a deficit in cognitive skill aquisition. In his perspective, once a child has aquired those skills and has been taught to generalize them across content areas, learning and mastery of data can be accomplished.

Initially, Letteri defined the cognitive style of the learner with other research instruments which diagnosed seven different cognitive dimensions including: field dependence/independence; scanning/focusing; breadth of categorization; cognitive complexity; reflective/ implusive; leveling/sharpening; and tolerant/ intolerant.

Letteri then rewrote the items of those established instruments into an all-inclusive combined assessment. It would take us much beyond the scope of this present paper to discuss each of these cognitive dimensions and the underlying construct of cognitive style. Suffice it to say that they represent skills on a bipolar continuum and that one extreme of each tends to

correlate with being highly analytic, whereas the other extreme of the continuum appears to be characteristic of being highly global.

Letteri's research revealed that those learners who had above-average success in academic tasks were: reflective; analytical; focused; complex; categorized narrowly, able to see details sharpley, and tolerant. Such learners were referred to as **Type I** learners.

In contrast, individuals who had below grade-level performance in academic areas were: impulsive; global; non-focused; able to view items only simply; categorizes broadly; levelers; and intolerant. These were the **Type 3** learners.

The profile of the Type 2 learner was somewhere in the middle of two extremes. It represented a learner who was only moderately successful in school.

Thus, according to Letteri, the composite cognitive profile could significantly separate and predict high academic performers from low academic performers.. The elements of the profile do not work independently, but are seen, by Letteri, as being interrelated in the composite process as prerequisites to learning.

With that as the rationale, Letteri presents the process of augmentation or clinical training, the purpose of which is to teach the proper information-processing operations and controls, and then provide training in cognitive structure construction principles; the learner then applies those principles and operations.

Thus, the goal of establishing a cognitive profile, and the process of augmentation, is to change a Type 3 or even a Type 2 learner, into a Type 1 learner.

In the field of learning styles today, there is debate over whether or not attempts should be made to change a student's style. The Dunns, perhaps, represent one view that children should be taught initially through their strengths, and that learning style assessments should serve only as diagnostic tools toward that end. Gregorc represents the middle ground, recognizing each learner's individuality, yet also recognizing times when learners must "flex". Letteri, is at the opposite extreme, not simply calling for adaptation or flexibility, but advocating training to actually change the students' cognitive profiles.

Letteri's approach is essentially a clinical one; however, he believes that the schools' efforts should be directed toward the development of curricular procedures based on the analysis of learning tasks, to establish the prerequisite cognitive profile needed for school achievement and success.

Ramirez

INSTRUMENT: Child Rating Form

Ramirez and Castaneda (1974) defined learning style in terms of the cognitive style dimension of field dependence/ independence and cultural differences. He referd to the behaviors resulting from style predispositions as being bicognitive and bicultural. The dimension of field dependence or

sensitive, as Ramirez refers to it, and field independence is his single cognitive assessment of style. In the Ramirez model, field independence is recognized as positive; however, unlike Letteri, Ramirez believes that field independence and the traits which correspond to it are positive because they are prized by schools which generally require field independence of students, not because they are necessarily inherently superior.

Students who are field sensitive are group oriented, sensitive to the social environment, and positively responsive to adult modeling, but less sensitive to the spatial incursions of others, less comfortable with trial and error, and less interested in the fine details of tasks that are non social. Such traits were also described as "global" by Brennan (1984) - - and are the opposite of detail-oriented, independent, and sequential - - characteristics often described as analytic.

Ramirez focused much of his work on minority populations in California and throughout the southwest. The development of a set of learning preferences is a complicated matter. However, Ramirez believes that it is not unreasonable to expect that the child socialization process contrubutes to this development. According to Ramirez, due to socialization practices, the average young Mexican American, black, and selected other minority students, are more field sensitive than they are field independent - - or more global than they are analytic. Understanding that can make classrooms more responsive to developing field sensitive learning approaches and in that regard, more responsive to the needs of many minority students. He believes also that minority students, for their part, can

learn to become bicognitive, having ability to function in the two extreme settings, just as they can become bicultural - - but that takes maturation and an excouraging support system.

Ramirez is concerned that a naieve understanding of the role of cultural values causes the formation of stereotypes. Similarly, in 1981, David Kolb warned of the danger in, what he called the misuse of learning style; specificially turning the ideas into stereotypes; misconceptions which might deny students the opportunity to develop.

Ramirez echoed that concern when he stated that, by using averages to describe the differences between groups, the dangers of stereotyping are increased. Furthermore, the great diversity within any culture has been ignored, and a construct which should have been used as a tool for individualization could become yet another label for categorizing and evaluating. Ramirez sees a potential contribution of cognitive styles research to multiethnic education as a framework for viewing and responding to the diversity *within*, as well as between, cultures.

The instrument originally developed by Ramirez and the late Alfredo Castanada was called the Child Rating Form. It was a direct observation format, yielding frequency of behavior scales that could be completed by the teacher or older children in a self-report survey. Ramirez has worked in bilingual education and has developed a primary bilingual program, "Nuevas Fronteras," based on his learning style model.

I have described Ramirez' work as primarily in the psychological/cognitive area. However, it is important to repeat

that traits associated with field sensitivity also are associated with global dimensions and specific sociological elements of authority and peer orientation, as described by the Dunns.

At a time when groups are begining to focus on black or Hispanic learning styles, I believe that Ramirez's model, while directed toward multi-ethnic concerns, also stresses what learning styles is all about; that is, *individual*, rather than stereotypical group, styles.

Reinert

INSTRUMENT: Edmonds Learning Style Identification Exercise

The Edmonds Learning Style Identification Exercise (ELSIE) was developed by Harry Reinert (1976) as a way of easily identifying the learning style preferences of his high school students.

From the label of the categories you can see that the ELSIE is geared primarily to an identification of perceptual modality. Visualization, written, sound, and activity reflect the perceptual categories in the Dunn, Hill, and other instruments. In fact, as I mentioned earlier, the categories of the Elsie are incorporated directly into the NASSP Learning Style Profile.

Reinert stated that the purpose of the Elsie is to give practical help to the classroom teacher interested in providing more effective counseling for students. The basic pedagogical

principle proposed here was that students should have their *intital* contact with new material by means of their most efficient perception.

The Elsie is composed of 50, one-word items read aloud to the student who then is asked to characterize his or her reaction to the word according to a forced choice among four alternatives: (a) visualization or creation of a mental picture; (b) alphabetical letters in writing -- the word spelled out; (c) sound; or (d) activity, an emotional or physical feeling about the word. Some examples used are ocean, good, God, and foot.

Keefe reported a significant .002 correlation between the ELSIE the corresponding subscale elements of the LSP. However, summative psychometric ratings reported by Curry (1987) showed ELSIE as having poor reliability and no validity. Clearly, the ELSIE does not have a strong research base. Despite that, it represents that genre of learning style instruments which have emerged out of individual practitioners' need to identify and teach to students' strengths.

Schmeck

INSTRUMENTATION: Inventory of Learning Processes

Like Charles Letteri, Ronald Schmeck comes to learning styles through a background in psychology. Schmeck believes that cognitive and personality studies, while useful, are not definitive, and that learning styles as a construct would be more useful.

From Schmeck's perspective, learning style is a predisposition on the part of some learners to adopt a particular

learning strategy regardless of the specific demands of the learning task. Learning strategies, as defined by Schmeck, is a pattern of information processing activities which the individual uses to prepare for a test of memory.

Schmeck views this information processing as a continuum; on one extreme, shallow/repetitive and reiteritive processors; on the other extreme, deep and elaborative processing. Shallow processors tend to remember the symbols used in communication, as depth of processing increases, the number of conceptual associations increases, giving the material more meaning. Thus, elaborative processors do more than just remember; they classify, compare, contrast, analyze and synthesize information. (This might well be compared to the higher levels of the Bloom taxonomy.) Thus, shallow processing is not a separate style, but it is one point on a continuum.

Schmeck's original Inventory of Learning Processes was a self-report instrument comprised of 62 items to assess students' behavioral and conceptual processes. Geared to the college student, as most of Schmeck's research and work is, this true/false format arranged items into the four scales I have listed: synthesis analysis; study methods; fact retention; and elaborative processing. One example of the relationship among these elements has been posed by Schmeck: it is possible to retain facts whether one processes in deepth or shallowly. However, Schmeck's research has determined that those who retain facts by processing deeply and attending to facts were more successful academically than those who processed shallowly and

also attended to facts. The latter could be said to be the memorizer, the one who retains information verbatim with little understanding.

Just one further comment on the study methods scale. Those students who studied often by employing drill type, classic, how-to-study methods, were found by Schmeck, in one study, to have high achievement motivation, but to lack the skill or ability necessary to engage in deep or elaborative processing. In fact, additional research has suggested that students who score high on that scale are "eager to please." Such data increases the dimension of the Schmeck model, and provides insight into the authority orientation of the learner.

In 1984, a later refinement of the instrument developed in conjunction with Entwistle and Ramsden expanded on the initial construct. Schmeck's instrument was designed solely for college students. In her analysis of that, Curry characterized it as having strong reliability, and strong validity.

HUNT

Instrument: Paragraph Completion Method

Dr. David Hunt is a Canadian theorist and researcher who approached learning style as those educational conditions under which students are most likely to learn. The basis of Hunt's model of Conceptual Level is a description of students in terms of their need for structure. Learners who have a low conceptual level are concrete, impulsive, and have poor tolerance for

frustration. They, according to Hunt, require a qreat deal of structure in the academic setting. Those learners at a mid-stage of Conceptual Level are referred to, by Hunt, as conforming or dependent. They are dependent on rules and authority, and are categorical thinkers. Such learners require structure, but should be given some choices.

Those at the higher cconceptual level are referred to as independent and are described as inquiring, self assertive, questioning, requiring less structure, and in need of alternatives.

We have viewed some learning style models that insist that students' styles should be changed, and others that urge teaching to the individuals' strength. Hunt, in a sense, promotes both, in what he refers to as a contemporaneous or developmental perspective. The contepeoraneous view indicates that the lower-cognitive level youngster in the classroom must be given structure if the teacher is to facilitate learning; however, for long-term purposes, provide high structure initially and gradually decrease the amount of structure so that self initiative can develop.

That perspective is similiar to Schmeck's who would agree that learning styles can, and sometimes should, be modified slowly over time, (specifically encouraging shallow processors to become elaborative processors).

Hunt's assessment instrument is called the Paragraph Completion Method. It consists of six lead sentences which the learner is directed to complete and write more about. Examples

include: What I think of school...; and When I am critized.... The specific response is important in terms of the complexitiy of the response, not the opinion stated. Hunt's is a semi projective assessment which requires specific training to score and interpret. Dr. Curry (1987) reported fair reliability and fair validity for this instrument.

Thus, Hunt's approach to learning style takes two dimensions -- conceptual complexity and need for structure, and relates each in a developmental framework.

KOLB

INSTRUMENT: Learning Style Inventory

Dr. David Kolb bases his conceptual framework of learning styles on, what he referrs to as, an experiential learning model. The core of the model is a simple description of the learning cycle of how adult experience is translated into concepts which, in turn, are used as guides in the choice of new experiences.

This is a four-stage cycle: immediate concrete experience is the basis for observation and reflection. Those obsevations are assimiliated into theory from which new implications for action can be deduced. Those implications serve as guides in acting to create new experiences. Thus the cycle has evolved.

To be effective, the learner requires abilities that are polar opposites: concrete experience vs abstract conceptualization; active experimentation vs reflective observation. However, as a result of hereditary equipment, past experiences and the demands of present environments, most people

develop learning styles that emphasize certain learning abilities over others.

Kolb's Learning Style Inventory is a nine-item assessment with four sub-items to be rank ordered by adults. Four dominant types of learning styles have emerged most frequently:

Converger: Such persons' dominant learning abilities are Abstract Conceptualization (AC) and Active Experimentation (AE); their greatest strength lies in the practical application of ideas.

Diverger Such persons have the direct opposite learning strengths of the converger. They are best at Concrete Experiences (CE) and Reflective Observation (RO). The greatest strength of these individuals lie in their imaginative ability. They enjoy excelling at viewing concrete situations from many perspectives.

Assimilator: Such persons' dominant learning abilities are Abstract Conceptualization (AC) and Reflective Observation (RO). Their strength lies in their ability to create theoretical models.

Accommodator: Such persons' learning abilities are Concrete Experience (CE) and Active Experimentation (AE). Their strength lies in actually doing things, in carrying out plans and experiments, and involving themselves in new experiences.

Kolb is based at Case Western Reserve in the Department of Organizational Research. His model and instrument were designed for and have been applied to adult organizational systems and management training. At least four different variations of Kolb's model are in use today. In terms of the strength of the instrument, Curry (1987) reported strong reliability but only

fair validity.

Gregorc

INSTRUMENT: Gregorc Style Delineator

The basis of Gregorc's model is that style consists of distinctive, observable behaviors which provide clues to the functioning of people's minds and how they relate to the world. Those mind qualities suggest that people learn in combinations of dualities, specifically, perception and ordering. Abstract, concrete,random and sequential proclivities have been found by Gregorc to combine into several styles.

Four distinct learning patterns are discerned in this model. While everyone may exhibit all four patterns to some degree, most people exhibit inclinations toward one or two. For instance:

Concrete sequential learners acquire knowledge through direct hands-on experience. They appreciate order and the direct step-by-step instruction.

Concrete random learners are best characterized by experimental attitudes and behaviors. Utilizing the trial and error approach, they tend to make intuitive leaps.

Abstract sequential learners are characterized, by Gregorc, as having excellent decoding abilities with written, verbal, and image symbols. They prefer to learn in a rational and sequential manner, and will learn better from authorities than through active experimentation.

Abstract random learners are distinguished by their attention to human behavior and their capacity to interpret vibrations. They prefer to receive information in an unstructured manner and, therefore, prefer discussions, and activities that involve multisensory experiences.

Gregorc believes that styles emerge from inborn predispositions, and that they can be encouraged, and discplined. Furthermore, learners with a natural Concrete Random style, and a low Concrete Sequential tipping, may find themselves in a situation where the need for Concrete Sequential ability is demanded by the task. In such cases, those individuals must be able flex, but may not be as smooth or efficient as in their natural style. Nevertheless, they still should be able to function.

Gregorc assesses style with the Gregorc Style Deliniator a self-report inventory based on the rank ordering of four words in each of ten sets. This instrument is similiar in format and design to the Kolb Learning Style Inventory. Observation and interviews are suggested to aid in categorizing learning preferences.

Like the Dunns and Hunt, Gregorc emphasizes the matching of instructional materials and methods to meet the range of individual preferences. However, he also emphasizes that non preferences should be utilized at times to encourage students to strengthen those areas.

McCarthy

Name of Model: 4 MAT System

Bernice McCarthy's model of learning styles is drawn from the work of Kolb's construct that all people sense and feel, observe and think, experiment and act. She proposes that all learners move continually between abstract conceptualization and concrete experience while learning.

McCarthy observed a pattern of sequencing and four learning style clusters. That became synthesised into a four-step model with the following labels and attributes:

Innovatives are curious, aware, and perceptive;

Analytics are critical, fact seeking, and philosophizing;

Common-sense people are hands on, practical, and now oriented;

Dynamics are risk taking, adaptive, inventive, and enthusiastic.

To that initial construct, McCarthy developed an overlay of hemisphericity, identifying the left-brain function as being associated with verbal, field independent actlivity, and the right-brain function as being responsible for visual/spatial, field dependent activity.

Critical to the 4 Mat approach is the concept that, while matching the educational cognitive styles of learners to instructors and preferred media may make the learning experience more comfortable, it is not seen by McCarthy as the best way to induce long-term memory. Thus, she proposes a spiral process of learning.

The learner enters into the spiral through a right-brained, structured activity designed for motivational arousal. This is

the sensing/feeling activity for the innovative learners.

The next component is dissection of the activity in great detail, providing the investigative, intellectual exercises that appeal to analytic learners.

Once the concept has been formulated, learners practice working with the concept; the left-brain goal is to achieve mastery of the concept. This relates to common sense hands-on practice and personalization.

Finally, the learner is asked to make right-brain choices of alternatives and apply as many as possible to real-world situations. This relates to the Dynamic Learner who is the action-oriented doer who thrives on implementing programs.

Thus, all four styles are presented with accompanying left/right hemispheric activities in every lesson. Utilization of the concept assumedly results in concrete experiences for learners, and the cycle is set for another move through the entire spiral.

Employing this spiral concept of full circle training, regardless of the individual's learning style, provides all students with the opportunity of being taught through their style strength 25% of the time and, in McCArthy's view, to be challenged 75% of the time.

By the very nature of this model's approach, instrumentation such as the Kolb Learning Style Inventory, and the Lieberman Hemispheric Mode Indicator, appear secondary to the instructional plan in that, regardless of students' learning styles, all receive the same instruction in exactly the same pattern, for exactly the same amount of time.

Conclusion

As we have seen, there is general consensus concerning the inportance of addressing learning style by all the theorists. And, as we review the chart, there are many areas of overlap among the models. Interest in specific areas, such as psychological/cognitive is apparent; however, multidimensional models would seem to offer a more thorough, encompassing, and responsive approach to the complexity of diversified differences in how students actually attend to, absorb, and retain new and difficult material.

Clearly, two major issues remain constant; the first is whether to teach to students' strengths or whether to attempt to expand their style. It may strike some observers as an irrelevant exercise to identify style, and then to set about *ignoring it*. However, a broader problem remains before a firm decision can be made. If psychobiologist, Richard Restak, author of The Brain: The Last Frontier, and Yale psychologist Armin Theis, (1979) are correct, then much of learning style is biologically imposed on humans; we can no sooner change our styles than permanently change the color of our eyes, hair, or skin. Research by Kagan and others appears to confirm that view. But can we modify, or to follow the medical analogy further, offer cosmetic surgery in the classroom? The debate continues.

The second issue revolves around whether or not teachers can *observe* the differences among students' styles or whether valid

and reliable instrumentation should be used. While teacher observation checklists can serve a function, even they may require some training and experience on the part of the teacher. As we have seen many models of style not only require training in administration, but also interpretation of the assessment. The decision by a school or district to take that step should include knowledge of the validity and reliability of the instrument.

Certainly, there is enough room in this newly emerging field for differences, and even dissension among theorists. Their differences of opinion are what make us pay attention to what they have proposed. Their beliefs are honest and have integrity, but some are based essentially on theory and others on extensive research in schools at every level. One is not necessarily better than the other; they may be mutually complementary; but some have exercised the obligation of providing strong experimentation behind the suggested practices, and others have not, as yet, been able to do that. However, the decision concerning which model to use in your school should rely on the following:

(1) Is it reliable and valid? For that information, I suggest you read Lynn Curry's (1987) psychometric review of instrumentation, obtainable from the Center for the Study of Learning and Teaching Styles, St. John's University, New York.

(2) Is there widespread practitioner use? For that, you could refer to the ASCD Directory of Practitioners, obtainable from Gerry Wedlund of the ASCD's Clearinghouse Bulletin; St. John's University's Learning Style Network Newsletter, both

of which provide such information in every issue; and Dunn and Griggs (1988) Learning Styles: Quiet Revolution in American Secondary Schools, Reston, VA: NASSP.

(3) Is there extensive research behind the model? I suggest that you examine either Abstracts International or research journals, or examine the Annotated Bibliography available through the Center for the Study of Learning and Teaching Styles, St. John's University, New York.

(4) Can you visit schools that are actually using the model in which you are interested? The ASCD's Directory of Practitioners is especially helpful, and I suggest that you make use of it. At the secondary level, Learning Styles: Quiet Revolution in American Schools is the best source. If it works for them, it can work for you. When you visit schools ask for evidence of how student achievement has increased, or that attitudes or behavior have improved. Ask how they know those things have happened?

(5) Can you obtain training for both you and your staff so that you know how to use individual styles to obtain increased achievement? Both Wedlund and Gregorc insist that there is a danger in having only a little knowledge about styles and then trying to implement school-wide programs. Identify either well-known practitioners or well respected theorists and spend the time it takes to really learn to implement a learning styles program.

The research is very clear on this point- - all children have individual learning styles. While some may disagree as to

the treatment of style differences in the classroom, educators today, cannot ignore the impact of this revelation.

Treating every child in the classroom the same way is not responding to their styles. Teachers and parents want more for students than the old hit-and-miss strategies of the past. Minimally, both want to help the underachiever and enhance the potential of successful students. Current research affirms that learning styles-based programs can and do succeed! (Dunn, Beaudry, and Klavas,1989).

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